



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/902,408	07/10/2001	Gerald T. Mearini	0937.0017	8259

7590 05/20/2005

D. Joseph English, Esquire
Duane Morris LLP
1667 K Street, NW
Suite 700
Washington, DC 20006

EXAMINER

KACKAR, RAM N

ART UNIT PAPER NUMBER

1763

DATE MAILED: 05/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/902,408

Applicant(s)

MEARINI ET AL.

Examiner

Ram N. Kackar

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,8 and 10-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,8 and 10-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date None.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Corrected drawings received on 3/21/2005 are acceptable.
2. The subject matter of this application admits of illustration by a drawing to facilitate understanding of the invention. Applicant is required to furnish a drawing under 37 CFR 1.81(c). No new matter may be introduced in the required drawing. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). In this instance it is required that both the optical thickness monitor and the multi-crystal quartz crystal thickness monitor positioned within the concentric aperture be shown in a drawing.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 11-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not provide an enabling disclosure for the use of an optical thickness monitor in combination with a quartz crystal

Art Unit: 1763

monitor in the claimed invention as shown in Figure 2-5. In particular in claims 12 which requires both optical monitor (not shown in drawings) and the quartz crystal monitor 20 being located on a rotatable disk 34. as shown in Figures 2A and 2B, the QCM 20 is not located on disk 34.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 2-4 are rejected under 35 U.S.C. 102(e) as being anticipated by Uchida et al (US 5,410,411).

Uchida et al teach a thin film deposition apparatus including a substrate support assembly (Fig 1 and 2) comprising, a thickness monitor which could be optical (Fig 2-19 and 24) or crystal type (Col 6 lines 37-39) disposed within a concentric aperture 18; a rotating member (16 and Col 7 lines 8-9); a shutter 22 for shuttering the disk as shown in Figure 2; and substrate 17 supported on a substrate chuck (rotating member or disk) 16 as shown in Figure 2.

Claim Rejections - 35 USC § 103

Art Unit: 1763

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. **Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al (US 5,410,411) in view of Bloom (US Patent No. 3,573,190).**

Uchida et al teach all limitations of the claim as discussed above except that the shutter means is a clamshell shutter.

Bloom teach a deposition apparatus (Fig. 1) including a shutter mechanism (Fig. 2) comprising a pair of shutters 38, 40 (clam shell shutter) serving as a substrate fixture shutter (column 2, lines 37-51).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the shutter mechanism as taught by Bloom in the apparatus of Uchida et al as an art recognized equivalent for the same purpose of allowing deposition of the surface of the substrate only during deposition process and closing the shutter after the deposition process.

Art Unit: 1763

See MPEP 2144.06, Art Recognized Equivalent for the Same Purpose, Substituting Equivalents Known for the Same Purpose (in re Fout, 675 F.2d 297, 213 USPQ 532 (CCPA 1982)).

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al (US 5,410,411) in view of Bloom (US 3,573,190) as applied to claims 5 and further in view of Tomofuji (US 6,142,097).

Uchida et al teach a thin film deposition apparatus including a substrate support assembly (Fig 1 and 2) comprising, a thickness monitor which could be optical (Fig 2-19 and 24) or crystal type (Col 6 lines 37-39) disposed within a concentric aperture 18; a rotating member (16 and Col 7 lines 8-9); a shutter 22 for shuttering the disk as shown in Figure 2; and substrate 17 supported on a substrate chuck (rotating member or disk) 16 as shown in Figure 2.

Uchida et al in view of Bloom do not disclose multiple substrates located concentrically about the monitor.

Tomofuji discloses a film forming apparatus (Fig. 8) including a substrate holder 2 holding a plurality of substrates 3 and an aperture 8 in the center of the substrate holder 2 for fixing a quartz oscillator for monitoring thickness of a film formed on the substrates (column 1, lines 60-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the substrate support mechanism as taught by Tomofuji in the apparatus of Uchida et al in view of Bloom in order to process more substrates for additional throughput.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al (US 5,410,411) in view of Ogure et al (US 5,630,881).

Uchida et al teach all the limitations of this claim except the rotation mechanism being magnetic induction.

Ogure et al teach a thin film forming apparatus (Fig. 1) including a susceptor (substrate holder) which is rotated using an induction motor 10 (magnetic induction rotating means) in order to increase the rotation speed of the susceptor as shown in Figure 2 (abstract and column 3, lines 30-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the rotation mechanism as taught by Ogure et al in the apparatus of Uchida et al in order to increase the rotation speed of the substrate holder which would increase the uniformity of the film formation across the surface of the substrate as shown in Fig. 2 of Ogure et al.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al (US 5,410,411) in view of Tomofuji (US 6,142,097).

Uchida et al teach a thin film deposition apparatus including a substrate support assembly (Fig 1 and 2) comprising, a thickness monitor which could be optical (Fig 2-19 and 24) or crystal type (Col 6 lines 37-39) disposed within a concentric aperture 18; a rotating member (16 and Col 7 lines 8-9); a shutter 22 for shuttering the disk as shown in Figure 2; and substrate 17 supported on a substrate chuck (rotating member or disk) 16 as shown in Figure 2.

Uchida et al do not disclose multiple substrates located concentrically about the monitor.

Tomofuji discloses a film forming apparatus (Fig. 8) including a substrate holder 2 holding a plurality of substrates 3 and an aperture 8 in the center of the substrate holder 2 for

Art Unit: 1763

fixing a quartz oscillator for monitoring thickness of a film formed on the substrates (column 1, lines 60-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the substrate support mechanism as taught by Tomofuji in the apparatus of Uchida et al in order to process more substrates for additional throughput.

10. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al (US 5,410,411) in view of Tomofuji (US 6,142,097) as applied to claim 10 above, and further in view of Holland (US 4,311,725).

Uchida et al in view of Tomofuji is discussed above.

As discussed above Uchida et al disclose optical or quartz crystal monitor but Uchida et al in view of Tomofuji do not disclose both at the same time.

Holland teaches a thin film deposition apparatus (Figs. 5, 6) including a quartz crystal monitor 14 in combination with an optical monitor system in order to improve the thickness monitoring mechanism (column 4, lines 40-64, and column 7, line 43 through column 8, line 21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the crystal monitor system as taught by Holland in the apparatus of Uchida et al in view of Tomofuji in order to further improve the accuracy of the thickness monitoring system.

11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al (US 5,410,411) in view of Tomofuji (US 6,142,097) and further in view of Holland (US 4,311,725) as applied to claims 11-13 and further in view of Bloom (US 3,573,190).

Art Unit: 1763

Uchida et al in view of Tomofuji and further in view of Holland teach all limitations of the claims as discussed above except that the shutter means is a clam shell shutter.

Bloom teach a deposition apparatus (Fig. 1) including a shutter mechanism (Fig. 2) comprising a pair of shutters 38, 40 (clam shell shutter) serving as a substrate fixture shutter (column 2, lines 37-51).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the shutter mechanism as taught by Bloom in the apparatus of Uchida et al in view of Tomofuji and Holland as an art recognized equivalent for the same purpose of allowing deposition of the surface of the substrate only during deposition process and closing the shutter after the deposition process. See MPEP 2144.06, Art Recognized Equivalent for the Same Purpose, Substituting Equivalents Known for the Same Purpose (in re Fout, 675 F.2d 297, 213 USPQ 532 (CCPA 1982)).

12. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al (US 5,410,411) in view of Tomofuji (US 6,142,097), Holland (US 4,311,725) and Bloom (US 3,573,190) as applied to claim 14 and further in view of Ogure et al (US 5,630,881).

Uchida et al in view of Tomofuji, Holland and Bloom teach all the limitations of this claim except the rotation mechanism being magnetic induction.

Ogure et al teach a thin film forming apparatus (Fig. 1) including a susceptor (substrate holder) which is rotated using an induction motor 10 (magnetic induction rotating means) in order to increase the rotation speed of the susceptor as shown in Figure 2 (abstract and column 3, lines 30-67).

Art Unit: 1763

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the rotation mechanism as taught by Ogure et al in the apparatus of Uchida et al in view of Tomofuji, Holland and Bloom in order to increase the rotation speed of the substrate holder which would increase the uniformity of the film formation across the surface of the substrate as shown in Fig. 2 of Ogure et al.

13. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al (US 5,410,411) in view of Tomofuji (US 6,142,097), Holland (US 4,311,725), Bloom (US 3,573,190) and Ogure et al (US 5,630,881) and further in view of Kendrick et al (US 5,025,664).

Uchida et al teach a thin film deposition apparatus including a substrate support assembly (Fig 1 and 2) comprising, a thickness monitor which could be optical (Fig 2-19 and 24) or crystal type (Col 6 lines 37-39) disposed within a concentric aperture 18; a rotating member (16 and Col 7 lines 8-9); a shutter 22 for shuttering the disk as shown in Figure 2; and substrate 17 supported on a substrate chuck (rotating member or disk) 16 as shown in Figure 2.

Uchida et al do not disclose multiple substrates located concentrically about the monitor.

Tomofuji discloses a film forming apparatus (Fig. 8) including a substrate holder 2 holding a plurality of substrates 3 and an aperture 8 in the center of the substrate holder 2 for fixing a quartz oscillator for monitoring thickness of a film formed on the substrates (column 1, lines 60-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the substrate support mechanism as taught by Tomofuji in the apparatus of Uchida et al in order to process more substrates for additional throughput.

As discussed above Uchida et al disclose optical or quartz crystal monitor but Uchida et al in view of Tomofuji do not disclose both at the same time.

Holland teaches a thin film deposition apparatus (Figs. 5, 6) including a quartz crystal monitor 14 in combination with an optical monitor system in order to improve the thickness monitoring mechanism (column 4, lines 40-64, and column 7, line 43 through column 8, line 21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the crystal monitor system as taught by Holland in the apparatus of Uchida et al in view of Tomofuji in order to further improve the accuracy of the thickness monitoring system.

Uchida et al in view of Tomofuji and further in view of Holland teach all limitations of the claims as discussed above except that the shutter means is a clam shell shutter.

Bloom teach a deposition apparatus (Fig. 1) including a shutter mechanism (Fig. 2) comprising a pair of shutters 38, 40 (clam shell shutter) serving as a substrate fixture shutter (column 2, lines 37-51).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the shutter mechanism as taught by Bloom in the apparatus of Uchida et al in view of Tomofuji and Holland as an art recognized equivalent for the same purpose of allowing deposition of the surface of the substrate only during deposition process and closing the shutter after the deposition process. See MPEP 2144.06, Art Recognized Equivalent for the

Art Unit: 1763

Same Purpose, Substituting Equivalents Known for the Same Purpose (in re Fout, 675 F.2d 297, 213 USPQ 532 (CCPA 1982)).

Uchida et al in view of Tomofuji, Holland and Bloom teach all the limitations of this claim except the rotation mechanism being magnetic induction.

Ogure et al teach a thin film forming apparatus (Fig. 1) including a susceptor (substrate holder) which is rotated using an induction motor 10 (magnetic induction rotating means) in order to increase the rotation speed of the susceptor as shown in Figure 2 (abstract and column 3, lines 30-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the rotation mechanism as taught by Ogure et al in the apparatus of Uchida et al in view of Tomofuji, Holland and Bloom in order to increase the rotation speed of the substrate holder which would increase the uniformity of the film formation across the surface of the substrate as shown in Fig. 2 of Ogure et al.

Uchida et al in view of Tomofuji, Holland, Bloom and Ogure et al do not disclose multi crystal quartz thickness monitor.

Kendrick et al teach multi-crystal quartz oscillator monitor in film forming process in order to reduce the downtime in a vacuum coating apparatus (column 1, lines 37-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement multi-crystal QCM in the apparatus of Uchida et al in view of Tomofuji, Holland, Bloom and Ogure et al in order to minimize the downtime of the apparatus.

Response to Arguments

Applicant's arguments filed 3/21/2005 have been fully considered but they are not persuasive.

Applicant's arguments regarding Zhou are moot in view of new grounds of rejection. The deficiencies related to new amendments are addressed above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N. Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

Art Unit: 1763

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571 272 1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RK

pl
PARVIZ HASSEZADEH
SUPERVISORY PATENT EXAMINER